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Review

The Role of Digital Technologies in Corporate Sustainability: A Bibliometric Review and Future Research Agenda

Sajead Mowafaq Alshdaifat [1], Noor Hidayah Ab Aziz [2], Mushtaq Yousif Alhasnawi [3], Esraa Esam Alharasis [4], Fatima Al Qadi [5] and Hamzeh Al Amosh [6,*]

[1] Financial and Accounting Sciences, Faculty of Business, Middle East University, Amman 11831, Jordan; s.shdifat@meu.edu.jo
[2] Faculty of Accountancy, Universiti Teknologi MARA, Johor Branch, Segamat Campus, Segamat 85000, Johor, Malaysia; noorh469@uitm.edu.my
[3] Faculty of Administration and Economics, University of Thi-Qar, Nasiriyah 64001, Iraq; alhasnawi78@utq.edu.iq
[4] Department of Accounting, College of Business, Mutah University, Karak 61710, Jordan; esraa_alharasis@mutah.edu.jo
[5] Department of Accounting, School of Business, Al Al-Bayt University, Mafraq 25113, Jordan; fatimaqadi97@hotmail.com
[6] Department of Financial Intelligence, University of South Africa, Pretoria 0003, South Africa
* Correspondence: hamza_omosh@yahoo.com

Abstract: This study aims to analyze trends, pioneers, emerging issues, and potential future research in the field of digital technologies such as blockchain, artificial intelligence, big data, fintech, and digital transformation for corporate sustainability. Using VOSviewer, R-studio, and BiblioMagika, this bibliometric review analyses 1251 articles published between 1995 and 2024 from the Scopus database. It highlights gaps in the knowledge and possible areas for further research in digital technologies and sustainability. Based on the findings, it can be determined that recent scholarly work has focused on topics such as digitalisation and sustainability, AI and sustainable development, blockchain and environmental technology, financial technology and green innovation, and energy policy and carbon emissions. This study is useful in helping emerging scholars identify and understand current trends in digital technologies and sustainability.

Keywords: digital technologies; sustainability; bibliometric analysis; VOSviewer; Biblioshiny

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1. Introduction

Digital technologies are revolutionizing conventional business models that have brought changes to the processes of conducting business and caused challenges to sectors and the global economy (Vial 2021). Digital technologies, including blockchain, artificial intelligence, big data, financial technology, mobile computing, and cloud computing, are some of the well-known technologies that have enabled such changes (Alshdaifat et al. 2024b; Karimi and Walter 2015). Besides digital technology, other factors, such as shifts in customer expectations, the availability of data information, and the increasing levels of digital competition, are forces that are driving this shift (Lemon and Verhoef 2016). The impacts of digital technologies extend to multiple sectors beyond businesses and customers (Agarwal et al. 2010; Chan et al. 2016). These are also expected to have implications in terms of environmental sustainability, the food supply chain, and the wellbeing of people (Al Amosh 2024; Kamble et al. 2018; Weersink et al. 2018). Due to these broad effects, there is a need for more research that investigates how digital technologies can improve sustainability across different sectors, which is still underexplored in the literature.

Digital technologies are constantly evolving, and this has forced the corporate world to embark on a digital transformation, with top management now considering this important (Alshdaifat et al. 2024c; Singh and Hess 2020). From this point, it is crucial to note that it is possible to look at digital technologies from various perspectives (Nwankpa and Datta 2017). For instance, Morakanyane et al. (2017) posit that digital transformation involves the changing of business models, customers, and values or operation processes with the help of digital technologies. Li et al. (2018) views it from a company perspective, where information technology is therefore the focus, while Legner et al. (2017) define it as a shift resulting from automation needs initiated by IT. By applying semantic analysis, Vial (2021) define digital transformation as 'the process of improving an entity by triggering significant changes to its qualities through the adoption of information, technology for computation, communication, and connectivity technologies'. These definitions indicate that 'digital transformation' is a process that has a significant effect on companies and creates new possibilities for upgrades. Sustainability means adjusting business models to the constantly changing nature of the digital environment and then adding to it (Beier et al. 2020). For companies to attain sustainable businesses, they should utilize resources, especially technology, in a moral way and in a manner that would enhance the status of current and future generations while having a positive environmental impact. The UN projected that USD 5 to USD 7 trillion would be required by 2020 to achieve their Sustainable Development Goals. This highlights the need to enhance investors' understanding of undertaking investments with a view of solving problems such as poverty, environmental degradation, emissions, and social injustice. For a sustainable economy, the required investments and technologies should be financed by the financial sector and by institutional investors especially (Chayjan et al. 2020). Some countries are also expected to invest more in green energy as part of measures that would help their economic transformation and as a way of implementing their climate change mitigation policies.

Sustainability is one of the many areas where artificial intelligence (AI) can contribute significantly (Alhasnawi et al. 2024a). The world is facing problems, such as global warming and environmental degradation, that are challenging and need unique and innovative solutions. Nishant et al. (2020) highlighted that the potential of AI is not only in combating pollution, poverty, and resource depletion, but it can even foster social and environmental governance. Big data, social media, knowledge management, and data science provide critical functions to support societal resilience and fulfil the sustainability agenda in the age of AI. This, coupled with exponential growth in the amount and variety of financial data generated by AI systems as they continue to evolve, means that there will be a constantly increasing demand for accounting and financial services that only technology can solve as new problems arise. Thus, it will increase the need for professionals such as skilled and experienced accountants, who will be able to control financial systems and are backed up by artificial intelligence. Over the past few years, there has been increasing interest from academics, researchers, and policymakers in sustainable investment (Nishant et al. 2020). Given the role of AI in sustainability, more detailed information and understanding of sustainable investment is helpful and valuable for researchers and investors, especially those who act in the best interest of others.

On the other hand, blockchain, a still-emerging technology, is revolutionizing different industries. It enables those who may not have a high level of trust in each other to engage in the exchange of records and updated documents stored in the digital domain, thereby creating trustless connections (Francisco and Swanson 2018). Blockchain is a mechanism for creating more transparent data sharing, improving a corporation's processes, decreasing expenses, and increasing collaborator effectiveness. Today, blockchain is not only limited to the financial system, but it has also diversified into the financial, government, education, health, supply chain, and manufacturing sectors (Queiroz and Wamba 2019). This technology has extended to emerging nations (Lim et al. 2019) and has potentially progressed in several developing nations beyond other technologies (Kamath 2018). In addition, blockchain supports innovative and sustainable production processes, tracks negative impacts on the environment, and provides real-time tracking and analysis of green or low-carbon data to assist with effective decision-making. These innovations have revealed many prospects in improving the industry and supply chain management, as well as enhancing environmental sustainability (Bai and Sarkis 2019).

Our work seeks to expand on instances in the literature that have linked digital technologies with sustainability, highlighting the areas currently lacking sufficient attention (Kunkel and Matthess 2020). Thus, this study explores the following research questions:

1. What are the publication trends in digital technologies, including blockchain, AI, BD, fintech, and digital transformation, related to sustainability in research, and how have they changed over time?
2. Who are the most productive authors, journals, institutions, and counties, and how have they contributed to sustainability development?
3. What is the current knowledge formation status regarding co-occurrence, collaboration, and co-authorship in digital technologies and sustainability?
4. What are the gaps in the existing literature and the potential research directions for future research?

This research offers a comprehensive literature review to identify and categorize the effects of digital technologies on environmental sustainability, focusing on four key domains: blockchain, artificial intelligence (AI), big data and fintech. In this way, it seeks to identify potential research directions, such as how digital technologies can be incorporated for sustainability in various industries. By examining 1251 Scopus publications from 1995 to 2024, this study employs bibliometrics to track publication trends, prolific authors, journals, institutions, and countries. It explores field-specific knowledge production processes, including co-occurrence, collaboration, and co-authorship, offering a detailed evaluation of current research trends and future research directions. The study outlines key contributors and themes, providing valuable insights into how blockchain, AI, big data, fintech, and digital transformation influence sustainability.

The following paper outlines major findings and contributions for research on digital technologies for sustainability. First, by identifying such trends as the rising technologies, such as blockchain or AI, effective resource allocation and funding can be further directed to the areas that make a difference. Despite the recognition of leading authors, journals and institutions in a given area encourage potential partners for further collaborations and to improve interdisciplinary work. Furthermore, mapping co-authorship and collaboration networks provides the opportunity to form strategic collaborations in order to intersect gaps between academia, industry, and government sectors. Many researchers and funding agencies are often interested in understanding how research themes evolve, so that they can plan for the future properly. Moreover, discovering the literature gaps involves paying attention to the existing areas that should be addressed in the best way possible for the sustainability of society. In general, these findings are useful for designing policies, developing academic approaches, and promoting common cooperation between industries and knowledge institutions with the aim of progressing sustainable digital solutions.

The remainder of this paper is organized as follows: Section 2 outlines the materials and methods. Section 3 highlights the details of the analysis with the results. Section 4 presents the directions for future research. Section 5 provides the conclusion, implications, and limitations.

2. Materials and Methods

This section presents the methodology used in this systematic approach to synthesize the currently available literature on the effect of digital technologies on sustainability. Through bibliometric analysis, this work is set to show a systematic literature review plan and reveal the growth and status of the field, influencing works, and promoting topics (Alhasnawi et al. 2024a). As Alhasnawi et al. (2024b) have stated, bibliometric analysis is one of the quantitative research methods that make it possible to study and evaluate the quantitative properties of bibliographic records, which encompass publications, citations, and other associated characteristics in a specific research domain. This method is especially useful for identifying relationships and co-occurrences of keywords, citations, and authors, leading to a concrete understanding of the domain's intellectual structure (Nyabakora and Mohabir 2024). The bibliometric mapping also enables a critical assessment of the intricate relationships among the key concepts and authors and how research topics are clustered, thus providing a strong foundation for identifying the important landmarks in advancing the field and formulating the research agenda.

2.1. The Information Sources

Scopus was chosen as the primary data source based on its large and rapidly growing database. This database covers virtually all areas of study, such as business, accounting, technology, and social sciences, making it suitable for searching relevant literature on digital technology and sustainability. Scopus is one of the world's largest multidisciplinary databases, providing the citations and abstracts of articles published in the field of industries, patents, books, articles in peer-reviewed journals, and conference papers. It also has powerful features for analyzing, filtering, and representing the search results (Baas et al. 2020). These make it a reliable source of data and information for large-scale analyses such as the bibliometric reviews for this study.

2.2. Defining Keyword

The accuracy of keywords in the given research field plays a crucial role in bibliometric and systematic research (Alhasnawi et al. 2024b). This study used specific search terms for document collection from Scopus. The keywords used in the title search included the following: "Digital Transformation", OR "digitalisation", OR "big data", OR "blockchain", OR "Artificial Intelligence", OR "AI", OR "Financial Technology", OR "Fintech", AND "sustainability" OR "Sustainability Development". These keywords have been widely used in prior literature for selecting the articles regarding this topic. Previous bibliometric analyses by (Atanasov et al. 2023; Ellili 2023; Kwilinski 2023) used similar keywords, like "Digital Transformation", "sustainable development", or "sustainability", whereby the impact of digital technologies on industries is analyzed. On the other hand, research conducted by (Ellili 2023) has examined "FinTech" or "Financial Technology" and "Sustainability" to figure out the role of financial technology in sustainable development. Contrary to previous studies, the present review extends the method of keywords, not just limited to digital transformation or financial technologies, but also covering sustainability and sustainable development (Alkhwaldi et al. 2024; Alharasis 2024; Alharasis and Alkhwaldi 2024; Alharasis et al. 2024). Thus, it underlines new developments in the digital economy and their possible contributions to managing global sustainability concerns, offering a broader view of the field.

2.3. Search Strategy

In terms of this research, a bibliometric review of the literature was conducted through the Scopus database with the aim of identifying articles on the use of digital technologies for sustainability, with all kinds of documents in focus from 1995 to July 2024. The total number of collected articles was more than 1383 articles; 125 of these papers were excluded because they were irrelevant to the research topic. The final sample was 1251 documents from periodicals belonging to twelve specialization areas (see Figure 1). The flowchart in Figure 1, adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, is presented below to clearly indicate the applied inclusion/exclusion criteria for enhancing the replicability of the research. As shown in Figure 1, only documents published in English language are included from all types of documents sources from journals, proceedings, and books. The use of these terms was effective in generating 1383 research studies between the years 1995 and July 2024. The aforementioned keywords were chosen purposefully to capture a wide range of digital technologies and their relation to sustainability to include the most available articles.

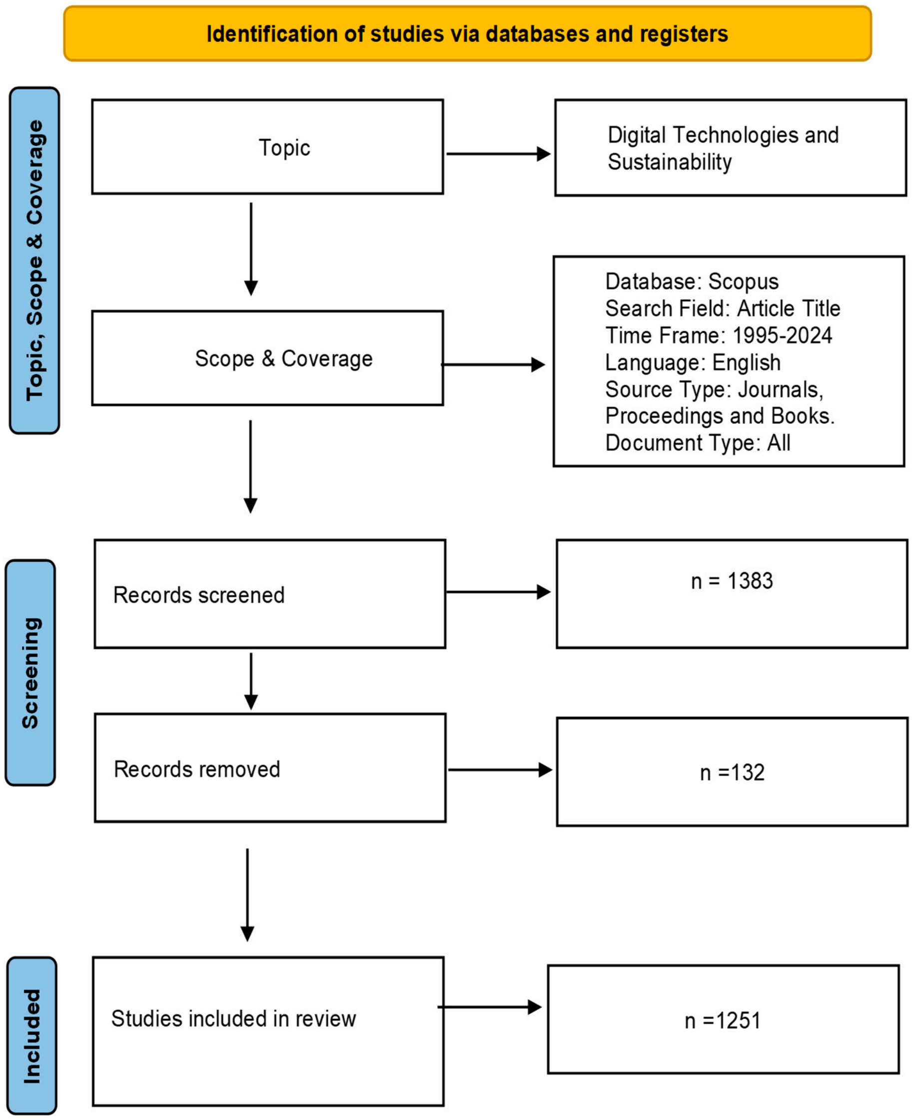

Figure 1. Flow diagram of the search strategy. **Source:** developed by authors.

2.4. Data Cleaning and Harmonization

The tools employed for data cleaning and harmonization in this study were OpenRefine and BiblioMagika (Ahmi 2023). These tools' main purpose was to ensure that items like the author's name, affiliation, keywords, and other 'meta tags' of the bibliographic details were in order. Some of these tools were used in solving issues of data heterogeneity and bringing in some level of coherence in the data without losing the accuracy of the research outputs, as we corrected any disparities in the data. The initial data cleaning process involved first saving the Scopus CSV format, and then there was the selection of appropriate files that needed cleaning. These features, like author's names, keywords, and affiliations, were further cleaned using OpenRefine, since this tool is most useful for cleaning data and normalizing and/or fixing errors with respect to standards. As shown in Figure 2, BiblioMagika was then applied for bibliometric calculations of the total papers (TPs), number of contributing authors (NCAs), number of cited papers (NCPs), citation per paper (C/P), citation per cited paper (C/CP), and citation per author (C/A). Furthermore, it determined other relevant indicators for the analyzed journals, such as CiteScore, SCImago Journal Rank (SJR), and source normalized impact per paper (SNIP). BiblioMagika also helped define which entries are missing and compute parameters such as A/P, C/Y, m-index, h-index (h), and g-index (g). The data were then cleaned and made uniform though possible keywords, which were then checked manually to avoid possible omission. Cells containing more than one value were joined and separators used during the separation process were put back to keep the data entries coherent. Last but not least, the cleansed data were saved back in the format used during the cleansing process. All these tools were applied in the study to achieve the validity of the next analyses and the credibility of the conclusions made. The harmonization and cleaning process greatly increased the density of the data, improved the clarity of the data in the research, and created a good foundation for the further study of more factors within the areas of business, accounting, technologies, and other social sciences fields.

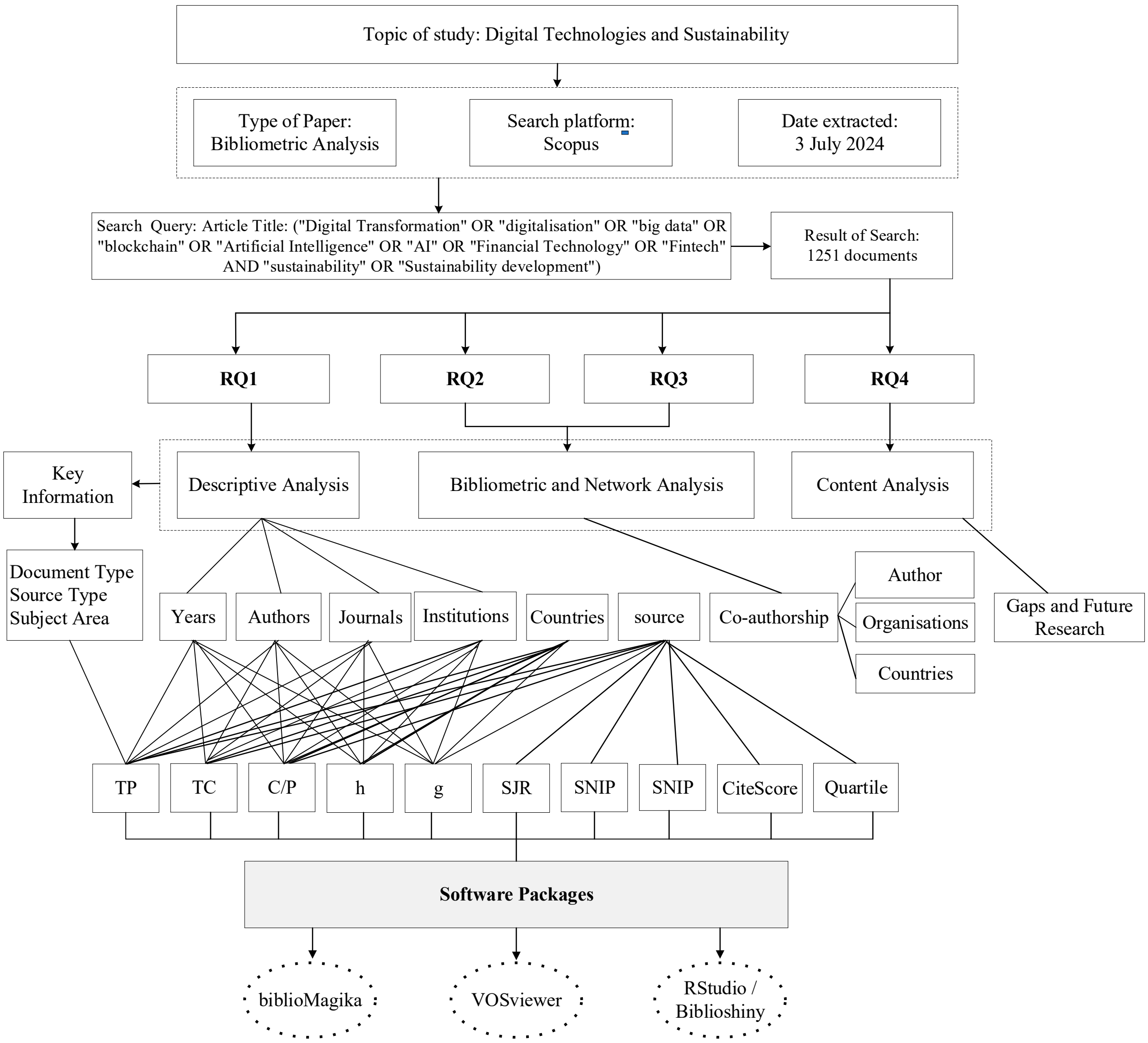

Figure 2. Outline of literature search process and literature analysis process. **Source:** developed by authors.

2.5. Data Analysis and Tools

This paper aims to employ a twofold approach to our literature review, including descriptive bibliometric analysis, VOSviewer software 1.6.20, and advanced network analysis. Thus, adopting this multi-faceted approach makes it possible to examine the literature related to digital technologies and sustainability comprehensively. All the collected documents have been scrutinized to filter out the repetitive or irrelevant documents, and the final list included only the relevant research for the analysis. This study adopts the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart, modified as Moher et al. (2009) suggested. The last set of documents constituted the framework of the study and their analysis. An increase in the number of publications in this area can be attributed to the increased complexity and knowledge intensity in the field. As this list of publications is growing, a bibliometric analysis was crucial to provide a systematic and comprehensive overview of the topic. The selected documents were downloaded in the "BibTeX" format (.bib) from the Scopus database for bibliometric analysis. The dataset was then transferred to the Bibliometrix R package utilizing the Biblioshiny web application, as suggested by Aria and Cuccurullo (2017). The use of the R package was deemed appropriate for this study, because it has immense functionality, especially in computations and data analysis. According to (Mustikarini and Adhariani 2022), it is one of the most popular tools, since it provides a comprehensive list of libraries and packages that allow for complex statistical analysis, data visualization, and data manipulation. In addition, the existence of so many R packages specially designed for bibliometric analysis enabled the use of more stable methods and approaches, therefore strengthening the current study.

3. Results

3.1. Documents Profiles

As illustrated in Figure 3, there is a summary of the 1251 publications that have been captured for the study, with document types including but not limited to articles, conference papers, book chapters, review papers and books. Regarding publication type, articles are dominant in number, with 671 articles (53.6%), followed by conference papers with 245 papers (19.5%). Thus, research articles from academic periodicals and peer-reviewed journals, conference papers, and papers submitted to academic conferences make up 73% of all publications, which indicates their importance. Meanwhile, the rest of the document types, including books, letters, and short surveys, add only a small fraction and account for 27%.

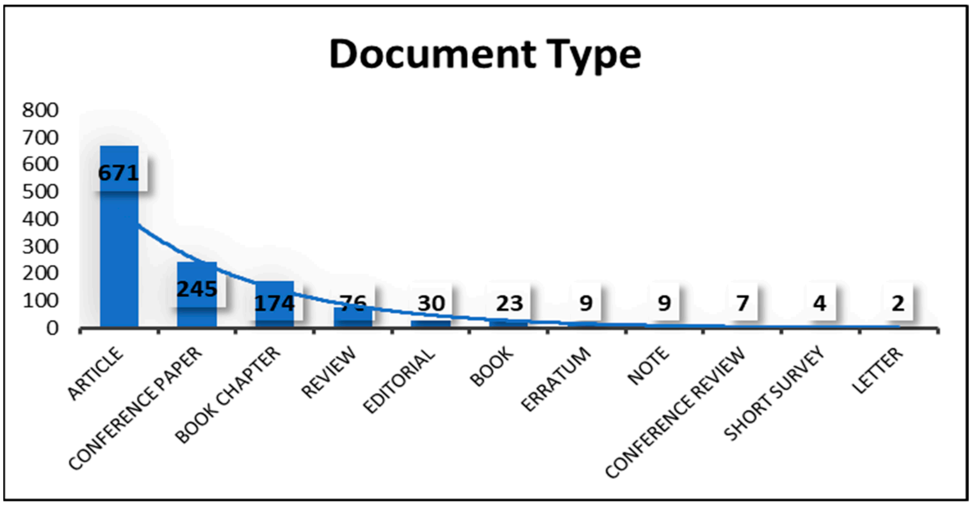

Figure 3. Document type. **Source:** developed by authors.

Figure 4 is a bar chart depicting different source types, which includes journals, conference, books, book series and trade journals. Of these sources, journals remain the most popular source type, as they comprise 63% of the documents, while trade journals are found to be the least frequent and account for only 2 percent of the total documents.

To further understand the contribution of digital technologies in striving for sustainability, the publications were categorized according to their domains of focus. Figure 5 highlights the major trends and research priorities across different fields. Out of all the disciplines, Computer Science gained the largest number of publications, equal to 483, which may be attributed to the worldwide trends of developing technology and computing. Subsequently, Social Science has 417 publications, which suggests that Social Science is the second most dominant field in terms of the available research on digital technologies and sustainability. Environmental Science and Business, Management, and Accounting also occupy notable ranks, with 407 and 390 outputs correspondingly. This underscores the need for economics and finance, particularly at this time, when there is a lot of volatility in the global financial systems. Fifth on the list is Engineering, which published 379 articles mainly in the field of engineering, contributing to innovation and solutions to practical engineering problems. This distribution, therefore, calls for an interdisciplinary, cross-functional approach to solving emerging technologies and sustainability studies' issues and potentials.

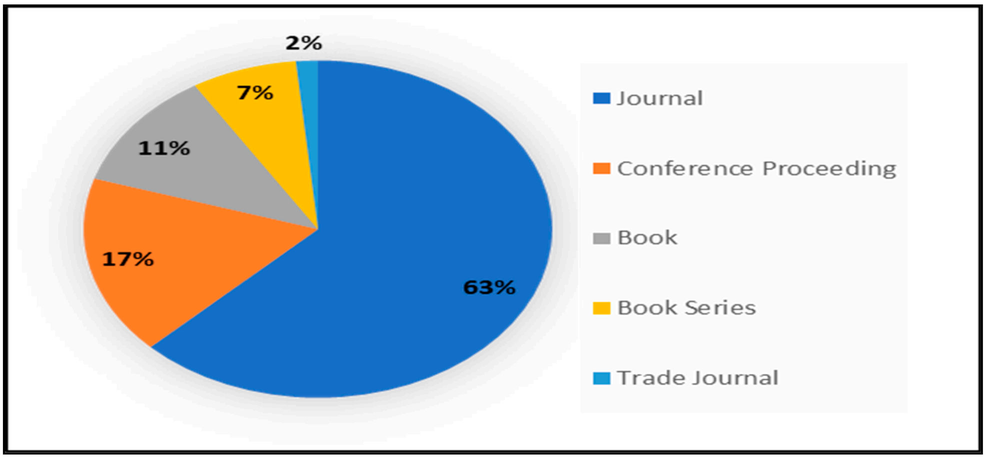

Figure 4. Source type. **Source:** developed by authors.

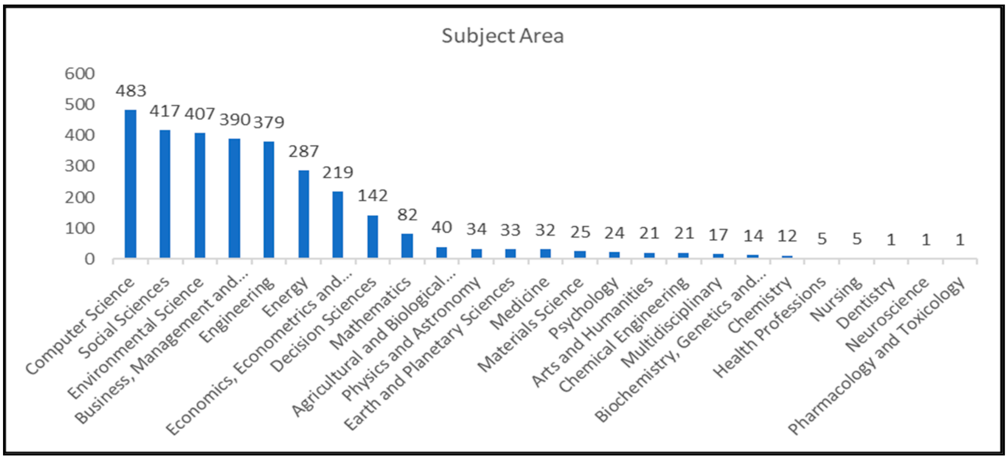

Figure 5. Subject area. **Source:** developed by authors.

3.2. Publication Trends

Table 1 and Figure 6 present the annual research amount and citations from the year 1995 to 2024 to understand the trend and shift in the scholars' perspectives and the impact they have on AI and sustainability. As can be seen from the citation data concerning TP, there was a very low level of research activity from 1995–to 2014, with only 1 TP and 2 NCP in 1995, which later increased to 3 TP and 9 NCP in 2014. At this time, the h-index and g-index were low. On the other hand, a significant increase from the previous period was observed during the period 2015–2024, with the number of publications (TPs) reaching 404 and cited publications (NCPs) reaching 1405 by 2023, with a remarkable improvement in both the 'h' index and 'g' index. An increase in particular research may be attributable to the growing global concern, specifically from 2015 to 2024, on sustainability issues, the development of modern AI technologies, and a number of policy shifts that encouraged the further development of sustainable development and the use of AI in sustainability. This trend demands attention to citation metrics, and researchers should pay more attention to it, as highlighted by the numbers of citation metrics below.

Table 1. Annual research output and citation metrics.

Year	TP	NCA	NCP	TC	C/P	C/CP	h	g	m
1995	1	2	0	0	0.00	0.00	0	0	0.000
2004	1	1	1	8	8.00	8.00	1	1	0.048
2005	1	1	0	0	0.00	0.00	0	0	0.000
2007	1	0	0	0	0.00	0.00	0	0	0.000
2011	1	1	1	9	9.00	9.00	1	1	0.071
2012	3	7	3	8	2.67	2.67	2	2	0.154
2013	1	2	1	23	23.00	23.00	1	1	0.083
2014	3	9	2	64	21.33	32.00	2	3	0.182
2015	8	18	5	95	11.88	19.00	3	8	0.300
2016	11	28	10	385	35.00	38.50	6	11	0.667
2017	19	59	18	1391	73.21	77.28	11	19	1.375
2018	35	77	30	1419	40.54	47.30	13	35	1.857
2019	48	143	45	1851	38.56	41.13	20	43	3.333
2020	98	275	90	4231	43.17	47.01	35	64	7.000
2021	119	402	103	3393	28.51	32.94	27	56	6.750
2022	218	707	171	3156	14.48	18.46	30	47	10.000
2023	404	1405	256	2533	6.27	9.89	24	38	12.000
2024	279	1001	85	357	1.28	4.20	8	14	8.000
Total	1251	4138	821	18,923	15.13	23.05	184	343	6.133

Notes: TP = total number of publications; NCA = number of contributing authors; NCP = number of cited publications; TC = total citations; C/P = average citations per publication; C/CP = average citations per cited publication; h = h-index; g = g-index and m = m-index. Source: Generated by the author using BiblioMagika®.

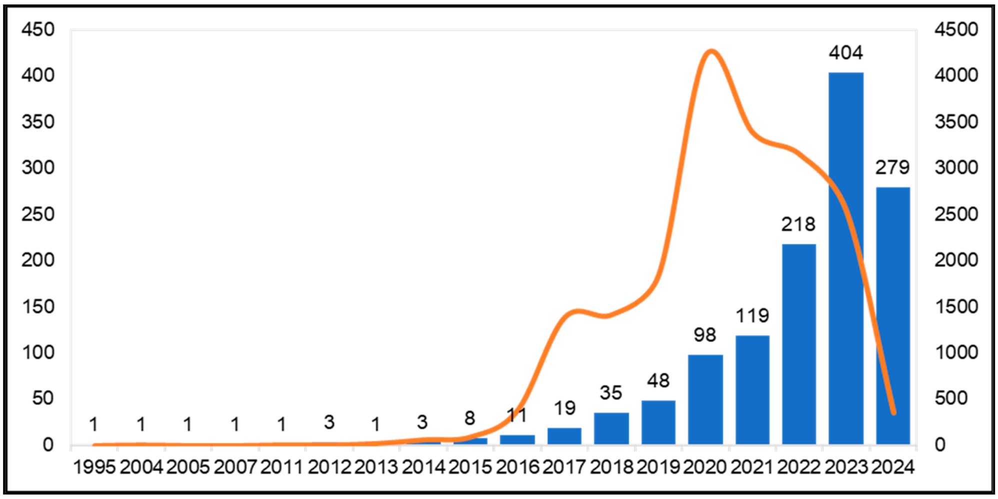

Figure 6. Total publications and citations by year. **Source:** developed by authors.

3.3. Publications by Authors

Table 2 offers a detailed overview of the most productive authors in the field, along with in-sights into the research context. Rushinek, Avi, and Sara F. from the University of Miami have the highest number of publications, with a total of five articles (TP). Nevertheless, the work conducted has only a total citation count (TC = 2) and an h-index of 1. Many TPs with low citation rates can be observed in the cases when the publications are recent and may lack sufficient time for citation, the findings are made in a rather specific area, or the work is not disseminated sufficiently. On the other hand, Choe Jong Min from the National University of South Korea has 3 TPs, but higher a h-index (3), and an impressive total citation (total) of 171, with an average of 57 citation per publication (C/P). In addition, as presented in the table below, Gordon Lawrence from the University of Maryland in the United States has only two publications (TPs) but a total number of published citation counts up to 284, with the average C/P of 142, which indicates highly influential work. A similar observation is also made for Wilkin, Carla L from Monash University in Australia, who has a total of one TP and NCP = 1; however, they have a total citation = 154. The low total publications with high citation rates imply that the research is highly significant, popularized, and relevant to providing solutions to problems or filling the existing voids in the field. In total, it can be seen that the majority of prolific researchers within this field are located in the United States, with China, Australia and South Korea also finding strong representation.

Table 2. The most productive authors.

Full Name	Current Affiliation	Country	TP	NCP	TC	C/P	C/CP	h	g	m
Rushinek, Avi	University of Miami	United States	5	2	2	0.4	1	1	1	0.024
Rushinek, Sara F.	University of Miami	United States	5	2	2	0.4	1	1	1	0.024
Choe, Jong-Min	Kyungpook National University	South Korea	3	3	171	57	57	3	3	0.094
Gordon, Lawrence	University of Maryland	United States	2	2	284	142	142	2	2	0.041
Hunton, James E.	Bentley University	United States	2	2	38	19	19	2	2	0.077
Chen, Guangying	Henan Polytechnic University,	China	2	2	3	1.5	1.5	1	1	0.067
He, Quanxiu	Henan Polytechnic University	China	2	2	3	1.5	1.5	1	1	0.067
Wilkin, Carla L.	Monash University	Australia	1	1	154	154	154	1	1	0.040
Bourn, Michael	University of Southampton	United Kingdom	1	1	76	76	76	1	1	0.022
Clancy, Donald K.	Texas Tech University	United States	1	1	27	27	27	1	1	0.500

Note: TP = total number of publications; NCP = number of cited publications; TC = total citations; C/P = average citations per publication; C/CP = average citations per cited publication; h = h-index; g = g-index, m = m-index. Source: Generated by the author using BiblioMagika®.

3.4. Publications by Institutions

Table 3 presents a list of institutions with at least five published articles and illustrates the distribution of the total publications (TPs) across universities and countries. The top performing institution is Uttarakhand University, India, with 13 research publications (TPs) and 5 cited publications (NCPs) and a very high h-index and g-index that suggest good research productivity and impact. On the other hand, there are universities with higher outputs, like Norges Teknisk-Naturvitenskapelige Universitet in Norway and Lovely Professional University in Punjab, with a total number of publications of 12 and 11, respectively. Meanwhile, for the total number of citations, Indian Institute of Technology in India, which has a TP value of 9, has a fairly large TC value of 64, meaning the institute's papers are widely cited in academia. This is even seen at Universidad Rey Juan Carlos in Spain, which has a lower TP value of 7 but a highly impressive TC value of 11, which shows that it values the quality and impact of its research more than the amount of research produced.

Table 3. The most productive institutions with a minimum of five publications.

Affiliation	Country	TP	NCP	TC	C/P	C/CP	h	g
Uttaranchal University	India	13	5	82	10.25	16.40	4.00	8.00
Norges Teknisk-Naturvitenskapelige Universitet	Norway	12	1	2	0.40	2.00	1.00	1.00
Lovely Professional University	Punjab	11	0	0	0.00	0.00	0.00	0.00
Universiti Teknologi Malaysia	Malaysia	10	3	15	5.00	5.00	2.00	3.00
King Khalid University	Saudi Arabia	10	3	5	1.67	1.67	1.00	2.00
Indian Institute of Technology Kharagpur	India	9	3	64	21.33	21.33	3.00	3.00
Peter the Great St. Petersburg Polytechnic University	Russia	9	2	3	1.50	1.50	1.00	1.00

Table 3. *Cont.*

Affiliation	Country	TP	NCP	TC	C/P	C/CP	h	g
Parthenope University of Naples	Italy	9	1	9	4.50	9.00	1.00	2.00
Tsinghua University	China	9	1	3	1.50	3.00	1.00	1.00
LUT University	Finland	8	0	0	0.00	0.00	0.00	0.00
Jadara University	Jordan	8	1	4	2.00	4.00	1.00	2.00
Bucharest University of Economic Studies	Romania	8	1	5	2.50	5.00	1.00	2.00
Universiti Sains Malaysia	Malaysia	7	1	2	1.00	2.00	1.00	1.00
Chalmers University of Technology	Sweden	7	1	4	2.00	4.00	1.00	2.00
Universidad Rey Juan Carlos	Spain	7	1	11	11.00	11.00	1.00	1.00

Notes: TP = total number of publications; NCP = number of cited publications; TC = total citations; C/P = average citations per publication; C/CP = average citations per cited publication; h = h-index; and g = g-index.

3.5. Publications by Countries

Table 4 and Figure 7 provide a list and graph of the top 20 most published, active, and impactful countries in the world. The top country is China, with 177 publications and a TC value of 145, which reveals the high research activity. Nonetheless, although China has published the most articles in this field, it does not possess the highest TC, h-index, or g-index value. India leads in terms of quantity, with 159 publications, but is ahead of China in terms of citation impact, with a TC value of 316 and a CP value of 13.17. This high citation per publication ratio may indicate that research by Indian scholars is highly relevant and informative for addressing key concerns raised in the usage of digital technologies around the globe. The USA also has 139 but a TC value of 102, ranking the country third in the list. Other countries like Malaysia and Saudi Arabia have a low number of publications, between 42 and 59, which implies that these countries should strive to produce more research in this area.

Table 4. The top 20 countries which have contributed to the publications.

Country	Continent	TP	NCP	TC	C/P	C/CP	h	g
China	Asia	177	25	145	2.84	5.80	7	12
India	Asia	159	19	316	13.17	16.63	9	17
United States	North America	139	9	102	6.38	11.33	5	10
United Kingdom	Europe	101	8	20	1.82	2.50	2	4
Germany	Europe	90	9	90	8.18	10.00	5	9
Italy	Europe	88	10	99	9.90	9.90	5	9
Spain	Europe	67	9	249	27.67	27.67	8	9
Malaysia	Asia	59	3	14	2.00	4.67	2	3
Australia	Oceania	56	5	20	3.33	4.00	3	4
France	Europe	55	5	32	6.40	6.40	4	5
Saudi Arabia	Asia	43	3	13	2.60	4.33	2	3
Sweden	Europe	42	4	174	43.50	43.50	3	4
UAE	Asia	37	0	0	0.00	0.00	0	0
Canada	North America	35	2	26	8.67	13.00	2	3
Turkey	Europe	34	3	13	4.33	4.33	3	3
Pakistan	Asia	30	2	29	14.50	14.50	2	2
Portugal	Europe	29	1	11	5.50	11.00	1	2
Brazil	South America	29	2	4	2.00	2.00	2	2
Indonesia	Asia	29	2	3	1.50	1.50	1	1
Norway	Europe	27	2	13	6.50	6.50	2	2

Notes: TP = total number of publications; NCP = number of cited publications; TC = total citations; C/P = average citations per publication; C/CP = average citations per cited publication; h = h-index; and g = g-index.

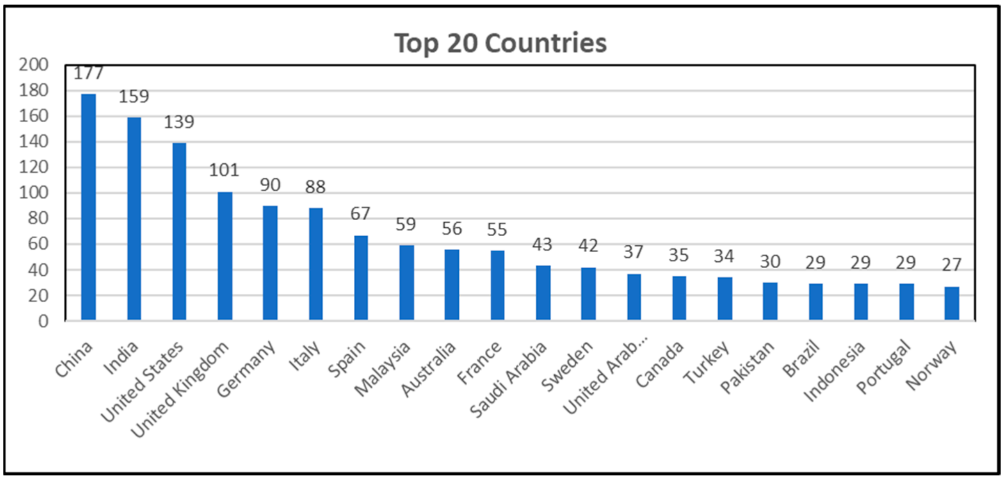

Figure 7. Worldwide scientific production indexed by Scopus on labour relations. **Source:** developed by authors.

3.6. Publications by Source Titles

Table 5 showcases the bibliometric analysis of different journals and conference proceedings in the domains of accounting and sustainability that produced a minimum of six papers. Sustainability (Switzerland) is the most productive in terms of total publications (TPs), with 121 papers. However, though fewer papers are published in the Journal of Cleaner Production and Technological Forecasting and Social Change, they have higher total citations (TCs) at 2701 and 1020, respectively, showing a profound impact in academia. The CP value is quite high for the total articles, especially for Technological Forecasting and Social Change at 78.46 and the Journal of Cleaner Production at 73.00, implying that the papers are influential. In contrast, conference proceedings like ACM International Conference Proceedings and Springer Proceedings in Business and Economics show lesser CP ratios, implying more restricted dissemination. With regard to Cite Score 2023, the following journals are listed at the top: Business Strategy and the Environment at 22.5, which proves this journal's ongoing relevance and scholarly significance, and Technological Forecasting and Social Change at 21.3. The SCImago Journal Rank (SJR) also reflects those trends, with Business Strategy and the Environment at 3.666 and Technological Forecasting and Social Change at 3.118. Subsequently, generic conference proceedings, such as Lecture Notes in Networks and Systems and AIP Conference Proceedings, rank relatively low regarding SJR and SNIP (source normalized impact per paper). The number of cited journals is enormous, and the majority of these journals belong to the first quartile among the journals, such as the Journal of Cleaner Production, Business Strategy of the Environment, and Resources Policy.

Table 5. Most active source titles.

Source Title	TP	TC	C/P	CiteScore 2023	SJR 2023	SNIP 2023	Quartile
Sustainability (Switzerland)	121	3487	28.82	6.8	0672	1.086	Q1
Journal of Cleaner Production	37	2701	73.00	20.4	2.058	2.236	Q1
Resources Policy	31	391	12.61	13.4	2.063	2.083	Q1
Technological Forecasting and Social Change	13	1020	78.46	21.3	3.118	2.945	Q1
Lecture Notes in Networks and Systems	12	30	2.50	0.9	0.171	0.282	Q4
Business Strategy and the Environment	10	307	30.70	22.5	3.666	3.043	Q1
E3S Web of Conferences	10	28	2.80	0.9	0.182	0.400	Q4
IFIP Advances in Information and Communication Technology	8	13	1.63	1.6	0.242	0.346	Q3
ACM International Conference Proceeding Series	8	7	0.88	1.5	0.253	0.233	Q4
AIP Conference Proceedings	8	25	3.13	0.5	0.152	0.291	Q4
Springer Proceedings in Business and Economics	7	2	0.29	0.7	0.151	.140	Q4
Energies	7	217	31.00	6.2	0.651	0.947	Q1
CSR, Sustainability, Ethics and Governance	6	57	9.50	0.6	0.121	1.253	Q3

Table 5. *Cont.*

Source Title	TP	TC	C/P	CiteScore 2023	SJR 2023	SNIP 2023	Quartile
Computers and Industrial Engineering	6	273	45.50	12.7	1.701	2.014	Q1
Heliyon	6	34	5.67	4.5	0617	1.257	Q1

Notes: TP = total number of publications; TC = total citations; C/P = average citations per publication; CiteScore = average citations received per document published in the source title; SJR = SCImago Journal Rank measures weighted citations received by the source title; SNIP = source normalized impact per paper measures actual citations received relative to citations expected for the source title's subject field.

3.7. Highly Cited Documents

Table 6 presents the highly cited top 20 articles that reflect the crucial contributions of digital technologies, including big data, blockchain, and artificial intelligence (AI), to the sustainability agenda. These articles emphasize the importance of these technologies in achieving the objectives of environmental and social sustainability, especially in smart city development, supply chain management, and various operational frameworks. The most highly cited papers are review papers.

Table 6. Top 20 highly cited articles.

No.	Authors	Title	Cites	Cites per Year
1	(Bibri 2018)	The IoT for smart sustainable cities of the future: An analytical framework for sensor-based big data applications for environmental sustainability	495	70.71
2	(Papadopoulos et al. 2017)	The role of Big Data in explaining disaster resilience in supply chains for sustainability	464	58.00
3	(Dubey et al. 2019)	Can big data and predictive analytics improve social and environmental sustainability?	418	69.67
4	(Bai and Sarkis 2019)	A supply chain transparency and sustainability technology appraisal model for blockchain technology	391	78.20
5	(Nishant et al. 2020)	Artificial intelligence for sustainability: Challenges, opportunities, and a research agenda	357	71.40
6	(Upadhyay et al. 2021)	Blockchain technology and the circular economy: Implications for sustainability and social responsibility	342	85.50
7	(Venkatesh et al. 2020)	System architecture for blockchain based transparency of supply chain social sustainability	265	53.00
8	(Castro et al. 2021)	Unleashing the convergence amid digitalization and sustainability towards pursuing the Sustainable Development Goals (SDGs): A holistic review	250	62.50
9	(Raut et al. 2019)	Linking big data analytics and operational sustainability practices for sustainable business management	248	41.33
10	(Arner et al. 2020)	Sustainability, FinTech and Financial Inclusion	238	47.60
11	(Isensee et al. 2020)	The relationship between organizational culture, sustainability, and digitalization in SMEs: A systematic review	236	47.20
12	(Feroz et al. 2021)	Digital transformation and environmental sustainability: A review and research agenda	227	56.75
13	(Denicolai et al. 2021)	Internationalization, digitalization, and sustainability: Are SMEs ready? A survey on synergies and substituting effects among growth paths	219	54.75
14	(Hazen et al. 2016)	Big data and predictive analytics for supply chain sustainability: A theory-driven research agenda	216	24.00
15	(Wu et al. 2017)	Toward sustainability: using big data to explore the decisive attributes of supply chain risks and uncertainties	495	70.71
16	(Jeble et al. 2018)	Impact of big data and predictive analytics capability on supply chain sustainability	464	58.00
17	(Park and Li 2021)	The effect of blockchain technology on supply chain sustainability performances	418	69.67
18	(Bibri 2019)	On the sustainability of smart and smarter cities in the era of big data: an interdisciplinary and transdisciplinary literature review	391	78.20
19	(Belaud et al. 2019)	Big data for agri-food 4.0: Application to sustainability management for by-products supply chain	357	71.40
20	(Parmentola et al. 2022)	Is blockchain able to enhance environmental sustainability? A systematic review and research agenda from the perspective of Sustainable Development Goals (SDGs)	342	85.50

Several papers, including (Bibri 2018; Papadopoulos et al. 2017), consolidate previous research to examine the role played by the Internet of Things (IoT) and big data analytics in sustainable urban development versus disaster management. For instance, in (Bibri 2018), the author utilizes findings from a literature review and thematic analysis to discuss energy consumption and waste management. This is proof that IoT-enabled systems have the potential to optimize resource allocation and build resilience within urban settings.

In the domain of blockchain, (Bai and Sarkis 2019; Upadhyay et al. 2021) emphasize its role regarding supply chain transparency and accountability, which are fundamental pillars of sustainable practices. For instance, Bai and Sarkis (2019) employ a hybrid group decision-making approach to capture changes in transparency and report a significant decrease in information asymmetry among supply chain participants.

Moreover, several of the most cited works address the intersection between digital technologies and the Sustainable Development Goals (SDGs). For example, Castro et al. (2021) carried out a comprehensive review regarding the impact of digitalization on achieving diverse SDGs, especially in climate action and sustainable consumption. The paper aggregates data over ten years that identify particular sectors where technology-driven initiatives have directly contributed to progress in sustainability goals. Likewise, Bibri (2019) examines the role of big data in making smart cities sustainable to study trends in resource consumption, pollution emissions, and efficiency of public services.

Another important theme is AI, with research such as (Nishant et al. 2020; Feroz et al. 2021) discussing both challenges and opportunities related to AI in sustainability contexts. These studies generally employ an integrated approach of data compilation through a detailed literature review involving information on AI applications in energy and resource management.

Lastly, studies like (Raut et al. 2019; Hazen et al. 2016) recap the importance of big data and predictive analytics in making supply chains more sustainable. Through a survey in the manufacturing sector, one study (Raut et al. 2019) shows that predictive models enable organizations to anticipate demand variations, which in turn reduces waste and overproduction. These results further confirm the critical role of data-driven decision-making in promoting sustainable practices within supply chains.

3.8. Top Keywords

Employing the top author keywords analysis and presenting the results offers a broad perception of the common themes explored in the context of the digital technologies and sustainability research field. The following keywords have the maximum frequency of occurrence, along with the record of the number of publications related to them and the percentage of the total keyword search, as shown in Table 7. Apparently, the term "Sustainability" shows a maximum frequency of (409 publications, 7.52%), which confirms its importance in different fields of study. "Artificial intelligence" (223 publications, 4.10%) and "Blockchain" (128 publications, 2.35%) represent the leading areas in this respect, examining how the two promising technologies can be applied to solve sustainability issues. Terms like "Digitalization" were identified in (123 articles, 2.26%) and "Digital transformation" in (91 publications, 1.67%), demonstrating considerable interest in the move to further digital platforms, a core enabler for sustainability vision. Among them, "Big Data" and "Big data analytics" (86 publications, 1.58%) stress the importance of data-driven decisions for sustainability. Similarly, one comes across "Machine learning" (36 publications, 0.66%) often in connection with the application of predictive analytics and optimization of environmental issues. Other important terms include "Environmental sustainability", which appears (53 times, 0.97%) and "Sustainable development", which appears 48 times, (0.88) suggesting that scholars are still concerned with sustainable issues in the environment and the society. It also reveals that various sectors are adopting digital technologies with specific technological applications, such as "Industry 4.0" with 35 publications (0.64%) and "FinTech" with (45 publications, 0.83%). The final keyword is "Climate change", which was identified with (19 publications, 0.35%) of the total, highlighting the need to embrace technological solutions for compounds facing climate challenges.

Table 7. Top author keywords.

Author Keywords	Total Publications (TP)	Percentage (%)
Sustainability	409	7.52%
Artificial intelligence	223	4.10%
Blockchain	128	2.35%
Digitalization	123	2.26%
Digital transformation	91	1.67%
Big Data	86	1.58%
Environmental sustainability	53	0.97%
Sustainable development	48	0.88%
FinTech	45	0.83%
Big data analytics	36	0.66%
Machine learning	36	0.66%
Industry 4.0	35	0.64%
Blockchain technology	33	0.61%
Sustainable development goals	32	0.59%
Supply chain	25	0.46%
Social sustainability	23	0.42%
Natural resources	21	0.39%
Green finance	20	0.37%
Innovation	20	0.37%
Climate change	19	0.35%

3.9. Co-Authorship Analysis

3.9.1. Co-Authorship by Author

VOSviewer software was employed to develop a network of co-authors based on the keywords. This visualization illustrates the co-authorship network between scholars who have published articles in this related fields. The analysis examines the following three key parameters: authors, organizations and countries. Figure 8 provides the co-authorship network among authors, with a requirement of having at least two publications together. From the 3729 authors in the Scopus database, 2187 met this criterion. The Linlog/modularity method was applied, with citation counts determining the weight. Scores indicate the average year of publication, and the thickness of the connecting lines reflects the strength of the collaboration. The different colours in the circles represent the mean number of years of the papers' publication, and the lines connecting these circles indicate co-authorship of at least one paper. The actual size of a circle characterizes the number of publications that have been co-authored by the particular researcher and, based on the size of the circle, it can be realized that researchers who authored more works collaboratively have large circles. The map highlights some popular authors such as Akram, Shaik Vaseem, and Kumar contributed to many co-authored articles. The colour of the circles expresses the year of latest co-authored publication; this legend also shows that the yellow circles are the most recent ones (2023), while the blue ones are the older ones (2020). Collaboration with other disciplines in AI and sustainability research ensures the interdisciplinary connectivity of the available knowledge to solve challenges. Also, it improves research productivity by bringing together many researchers to work on a single study, which increases the quality of research and the chances of getting published in high-impact journals.

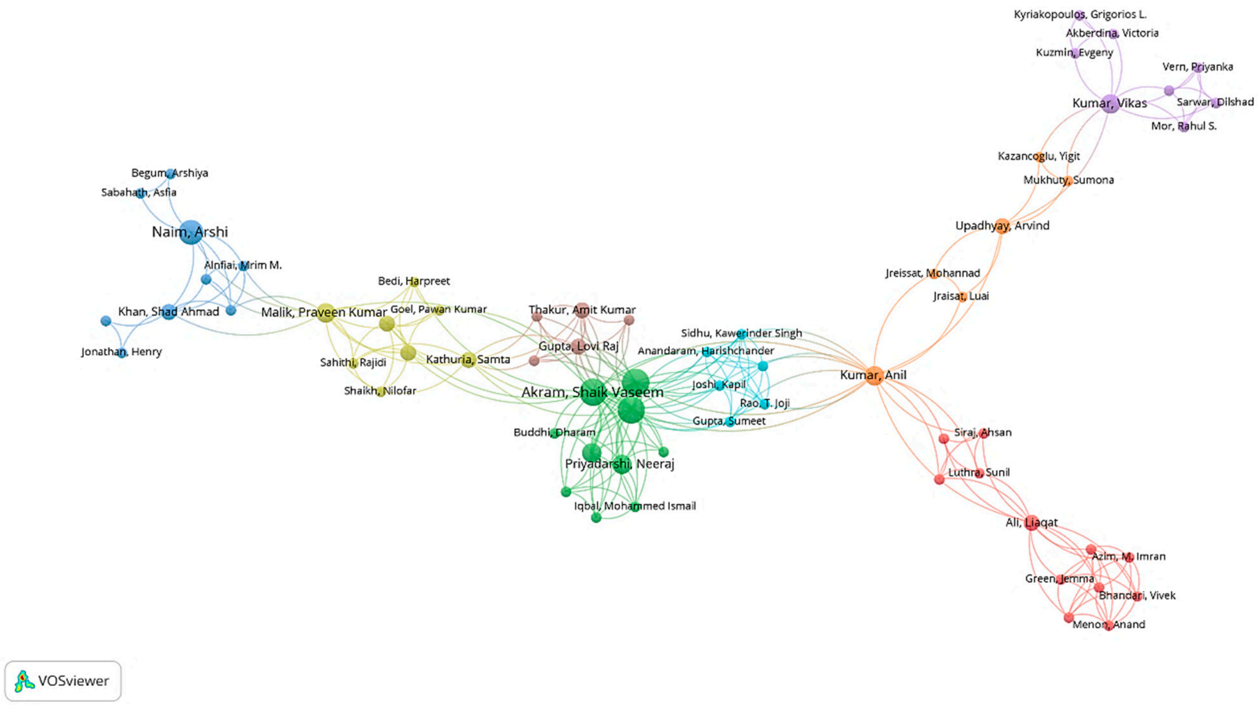

Figure 8. A network visualization map of the co-authorship by authors. **Source:** developed by authors.

3.9.2. Co-Authorship by Organizations

An overlay map is presented in Figure 9, highlighting the co-authorship among the institutions, where the node size signifies the publication output and the link represents collaborative efforts. The first cluster showed the co-authorship between Lund University (Sweden), Taylor's University (Malaysia), and the University of Canterbury (New Zealand), making their connections evident regarding the research on digital technologies and sustainability. The second cluster encompasses Linnaeus University (Sweden), Inha University (South Korea), and Kyung Hee University (South Korea) and points to another group of institutions engaged in this field. This map highlights the cooperation and research orientation of these institutions in this area. An indication is that the consolidation of key institutions strengthens any research, as it draws on various expertise and resources. It also enhances the chances of receiving funds, as projects with more stakeholders are usually more appealing to the fund sources. Also, such partnerships help build international research partnerships, where institutions from different parts of the world come together to tackle some of the challenges more efficiently.

3.9.3. Co-Authorship by Countries

Figure 10 presents the country network analysis of collaborative relationships among different countries in the emerging technologies literature. This analysis offers insights into the key contributing countries and their collaboration patterns in the emerging technologies literature. In this case, China, India, the UK, and the US emerge as key players, indicating a high level of research output and collaboration with other countries. China and other countries, such as the UK, have established research cooperation in generating research papers that are on new and emerging technologies. Secondly, the preferred research locations highlighted in Figure 10 are Asia and the European countries that actively contribute and engage in digital technology and sustainability research. As a result of the established research infrastructure and strong academic institutions, we see high research output and collaboration in emerging technologies from countries like China, India, the UK, and the US. It is established by collaborative networks and joint research that have developed stronger sources of power partnerships, like the China–UK partnership. Moreover, it also highlights that the current research mainly lies in the Asia and Europe region due to the economic and policy-based promotion of digital technologies and sustainability.

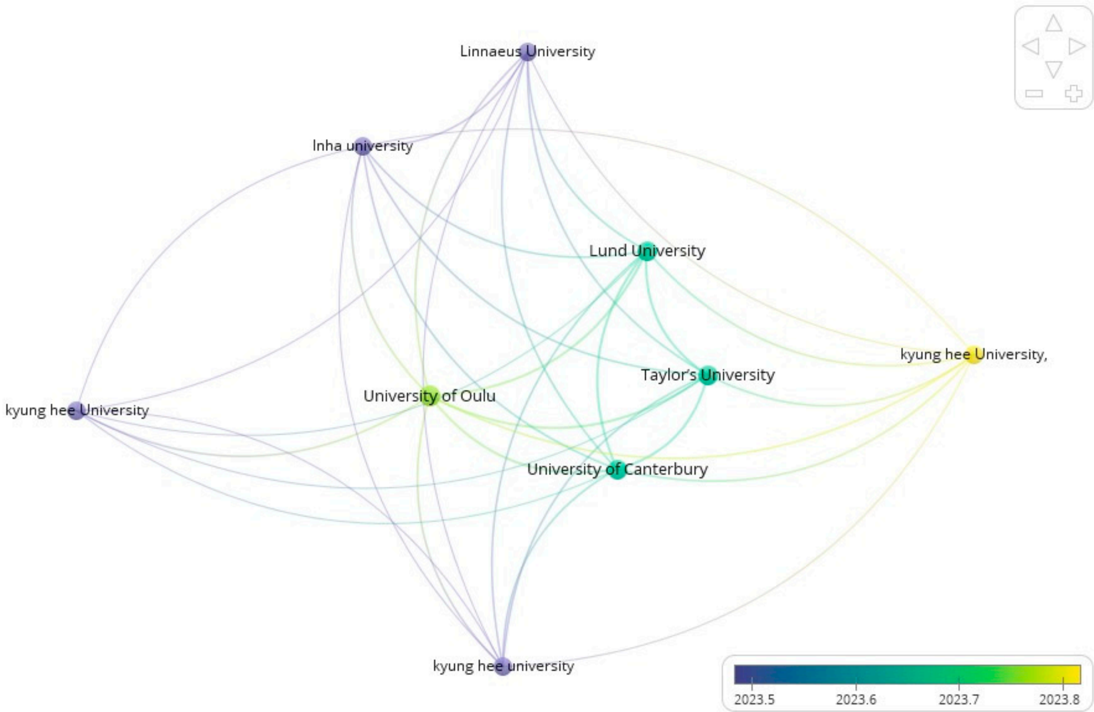

Figure 9. An overlay visualization map of the co-authorship by organizations. **Source:** developed by authors.

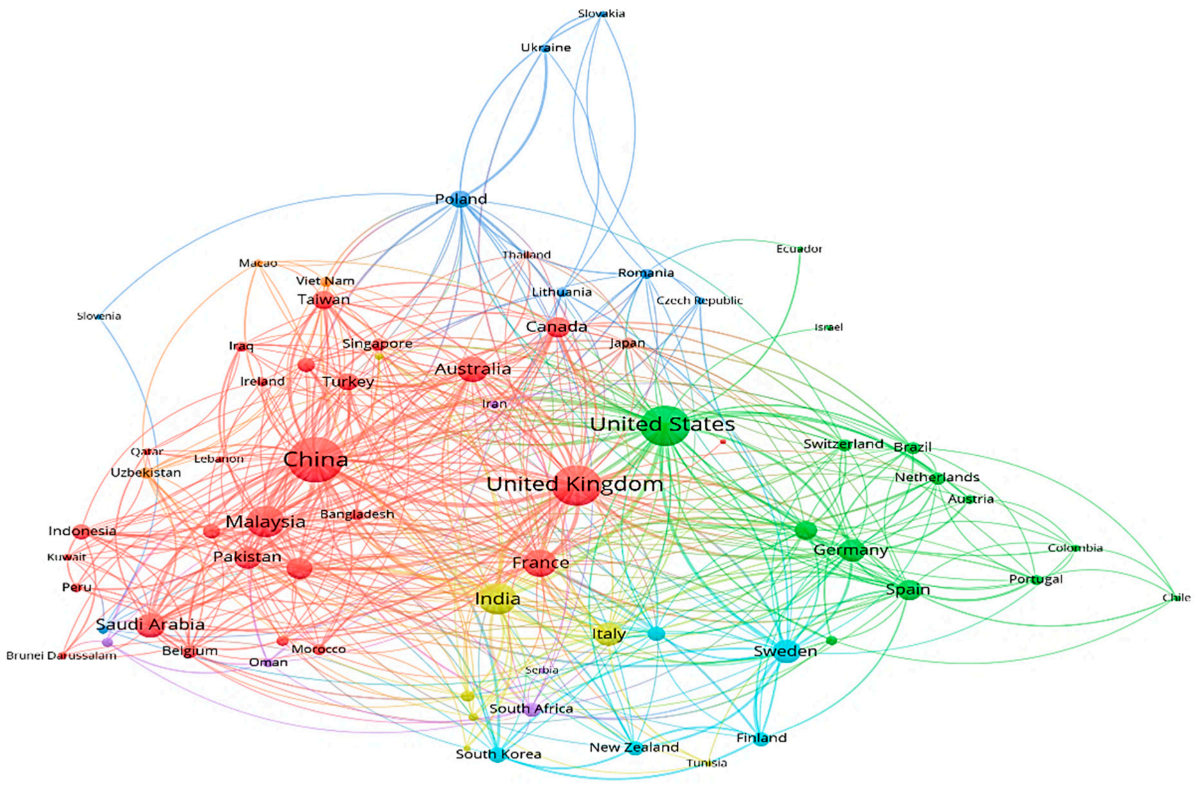

Figure 10. A network visualization map of the co-authorship by countries. **Source:** developed by authors.

3.10. Co-Occurrence Analysis

Co-Occurrence Analysis of Authors' Keywords

The aim of the co-word analysis is to find terms and cluster them according to their frequency within articles from the Scopus database, including words from abstracts and keywords. At least six occurrences for keywords reduce the likelihood of the inclusion of insignificant terms into the analysis. From 1251 documents, 2735 keywords were retrieved, out of which 82 keywords passed the frequency criterion. These keywords are depicted in Figure 11, an example of the following areas of active research: digitalization, sustainability AI and sustainability, and blockchain and environmental technology. The visualization reveals several thematic clusters:

- Cluster 1 is formed based on keywords such as digitalization, sustainability, blockchain technology, and innovation.
- Cluster 2 concerns smart cities, supply chains, big data analytics, and business models.
- Cluster 3 is linked to techniques of artificial intelligence, sustainable development, IoT, machine learning, and energy consumption.
- Cluster 4 consists of financial technology, natural resources, green innovation, energy policy, and carbon emissions.

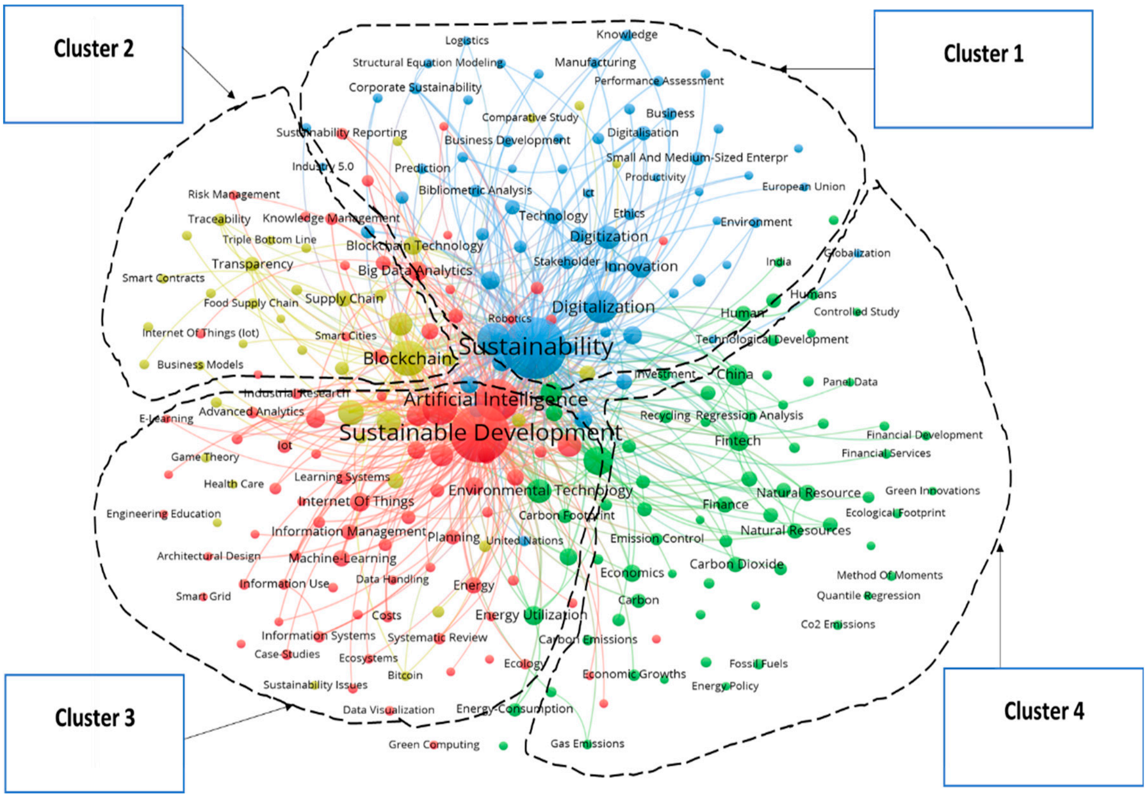

Figure 11. A network visualization of the authors' keywords. **Source:** developed by authors.

The thickness of the linked lines within the visualization represents the degree of the occurrence of a particular term with the other terms. The keywords identified in the co-word analysis highlight several key research areas and trends as follows:

1. Digitalization and Sustainability: This suggests a focus on the role of digital technologies in supporting sustainability and sustainable solutions. Studying in this field may examine the possibilities of applying technologies to mitigate climate change and improve the environment's quality (Balogun et al. 2020; Dwivedi et al. 2022; Saleh and Mansour 2024).

2. Artificial Intelligence and Sustainable Development: This cluster focuses on using AI technology to promote sustainable development. There are opportunities to study the application of AI in enhancing resource utilization, energy efficacy, and the utilization of sustainable innovations (Ozen and Gedikli 2023; Reddy et al. 2024; Mansour et al. 2023).
3. Blockchain and Environmental Technology: This appears to indicate an interest in applying blockchain technology to environmental issues. Research efforts can continue to identify blockchain's capabilities in increasing the transparency of environmental tracking, supply chain sustainability, and carbon markets (Park and Li 2021; Parmentola et al. 2022; Esmaeilian et al. 2020; Shubita 2021).
4. Financial Technology and Green Innovation: Within this cluster, the emphasis is put on fintech and changes that may facilitate the process of making the environment more sustainable. These topics may include green financial instruments, sustainable financial systems, and the functions of fintech for sustainable development (Chiappini et al. 2023; Liu et al. 2022; Zhang et al. 2022).
5. Energy Policy and Carbon Emissions: This goes a long way in stressing the role of policy frameworks and technologies in regulating carbon emissions. Research could be devoted to re-constructing the successful development of energy policies aimed at reducing carbon emissions, and the use of new technologies in managing emissions (Linares-Rodríguez et al. 2022; Woon et al. 2023; Shubita 2023).
6. IoT, Machine Learning, and Energy Consumption: This cluster points to the application of the Internet of Things and machine learning regarding the inefficient consumption of power. Studying this could examine how these technologies could be empowered to decrease energy usage in different industries (Cantini et al. 2021; Nižetić et al. 2020; Wang et al. 2022).
7. Smart Cities and Big Data Analysis: This points to the priority of big data in creating smart cities. Future work could look at how big data helps enhance the design, construction, and general efficiency of the city (Kong et al. 2020; Sörensen et al. 2021).

3.11. Thematic Analysis

Figure 12 is a thematic map showing the range of topics authors have covered over the years. This study used the "keywords plus" co-occurrence method to create these thematic maps using Biblioshiny 4.0.0. This software is capable of carrying out such an analysis. Thematic maps divide themes into four quadrants based on centrality (X-axis) and density (Y-axis). Centrality shows how much a theme interacts with others and how important it is in the field. Density shows how close together themes are in a cluster and how cohesive they are.

Motor Themes are in the upper-right quadrant, with high centrality and high density. They are major players and are well developed in the field. Examples include AI, deep learning, environmental sustainability, and data mining, which are big-impact topics.

Niche Themes: These are digital technologies applied to game theory, sustainability performance, renewable energy, smart contracts, and financial development. They have a strong influence on specific fields (high centrality) but a limited depth of research (low density). They are impactful but still emerging in finance and related areas.

Emerging Themes: In the lower-left quadrant are themes such as corporate sustainability reporting and AI. These are new trends, and they will become more central as researchers delve deeper.

Basic Themes: These established research areas, such as sustainability, AI, digitalization, blockchain technology, and environmental studies, have high density. They have a strong knowledge base in their field. However, with low centrality, they are mostly contained in their own niche.

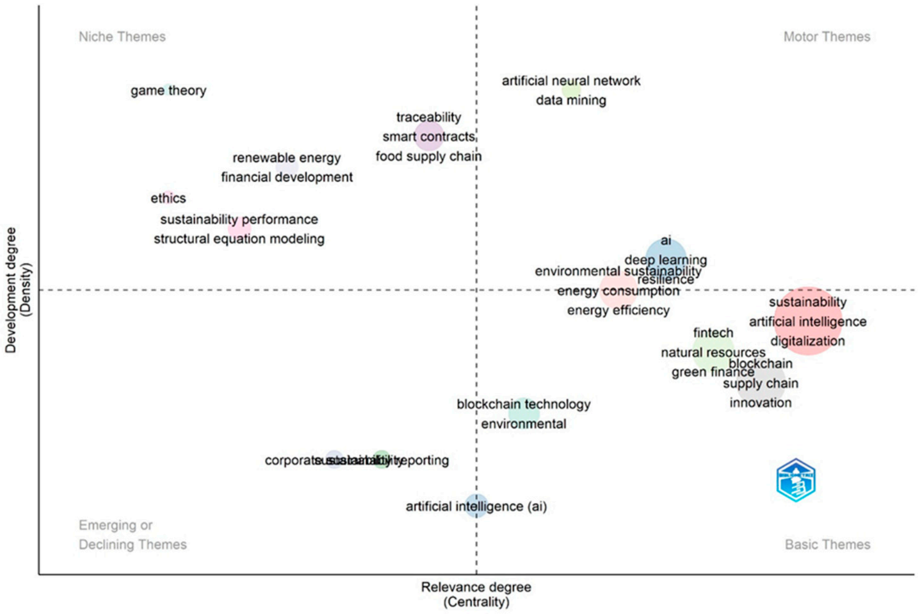

Figure 12. Thematic map. **Source:** developed by authors.

4. Directions for Future Research

The current study's findings suggest that some topics and contexts represent possibilities for further investigation.

4.1. Potential Research Topics

As for the directions for further research on digital technologies and sustainability, it is possible to list the following topics that may be of interest for further research. First, it may be insightful to consider how various digital technologies can be employed to promote sustainability initiatives and breakthroughs in different fields (Atiyah et al. 2024; Costa et al. 2023). Therefore, there is a possibility to improve AI solutions by focusing on sustainability solutions, such as energy efficiency, waste reduction, and resource management, that correspond to the environmental efficiency trends. Second, more research should be conducted on using blockchain in environmental governance (Ahl et al. 2022). Subsequent research studies could focus on how blockchain technology could be adapted to monitor sustainability indices, promote sustainability projects, and increase efficiency in sustainability performance evaluations.

Third, there is increasing interest in exploring fintech innovations for sustainability (Kwong et al. 2023). Subsequent research may examine how sustainable investments can be supported through the use of fintech to enhance environmental responsibility and the needs of sustainable development. Fourth, the interaction between policies and technologies has not received the attention it deserves (Ning and Guo 2022; Valle-Cruz et al. 2020). Possible future research could continue the discussion of how policy can interlink with technological advancement to mitigate the effects of climate change, regulate carbon emissions, and give further direction on integration of concepts with better and clearer strategies towards sustainability.

Fifth, the IoT and machine learning capabilities in terms of energy utilization and smart infrastructure should be discussed (Ahmad et al. 2022; Mazhar et al. 2023). As these technologies might have potential to contribute to the building of the more effective and resilient cities of the future, further research on these technologies should be a priority. Last but not least, big data analytics presents significant prospects for improving the sustainability of the urban environment (Himeur et al. 2023; Li et al. 2023). Further research on the ways through which big data can be used in order to build better and more sustainable cities creates potential for more effective means for solving the multifaceted challenges of cities' development as well as environmental concerns. It is critical that these areas are recognized and developed as significant opportunities to progress research pertaining to digital technologies in international sustainable development.

4.2. Potential Research Context

In terms of research context, it is crucial to look at developed countries and emerging economies, which continue to pose different effects of the COVID-19 pandemic (Madrid-Guijarro et al. 2024; Al-alawnh et al. 2024; Alshdaifat et al. 2024a). For future studies, it might be interesting to investigate how using the aforementioned technologies for sustainability purposes differs in developed and emerging economies. For example, the developed nation could possess a better infrastructure to support sustainability coupled with the use of AI, while the emerging economy may experience different dynamics and different challenges as well as opportunities in integrating artificial intelligence in supporting sustainability solutions. Comparative research could then determine factors that enable and hinder sustainability in both settings, which could help develop strategies for enhancing sustainability worldwide. Lastly, the effect of COVID-19 on sustainability could be another important domain of further research, especially in analyzing the effects of the pandemic on the development of digital technologies in developed and emerging countries (Aziz et al. 2024; Chiwaridzo and Masengu 2023; Gao et al. 2023). The crisis could have had either a positive or a negative impact on the development of these trends and comparative investigations might help to identify how certain trends were boosted or undermined because of the crisis, which may contribute knowledge for future adaptations to potential disruptions in the global environment.

5. Conclusions, Implications, and Limitations

The increased attention to studying digital technologies in sustainability and the proliferation of studies in this area indicate the need for the further exploration of these topics in both academia and business. The present paper offers a bibliometric view of the literature from 1995 to 2024. It unveils trends and shifts in social entrepreneurship scholarship in terms of quantity and growth, together with changes in major research topics over the course of time. The findings enhance the current literature by recognizing the influential authors, journals, institutions, and countries, thus providing a better understanding of how digital technologies like blockchain, AI, big data, fintech, and digital transformation are used to promote sustainability. Moreover, this analysis adds to the understanding of the processes of knowledge creation regarding the choice of co-authors, collaboration, and co-occurrence, which are crucial for the further development of the interdisciplinary field. Besides identifying the state of knowledge in the field, this study also prepares the reader for future research trajectories that may be worthwhile to explore in the future for more knowledge advancement by scholars and practitioners.

We present the following implications for practitioners and policymakers interested in using digital technologies in sustainability initiatives. Firstly, it is possible to use the identified trends in blockchain, AI, big data, fintech, and digital transformation to improve companies' efficiency and sustainability performance. For example, AI and big data analytics in operations can improve decision-making in areas like resource management, supply chain operations or carbon footprint management. Furthermore, it is evident that collaboration and co-authorship networks exert significant influence, and organizations should engage in research partnerships with academic institutions and other players in the market for the formation of strategic partnerships to promote the growth of innovation. Further, the findings may be useful for practitioners, as it allows for a comparison of their status and the development of digital technologies with world practices, and identifies possible divergence in this sphere and potential risks. Last but not least, based on the findings of this study, policymakers can develop frameworks and regulations that support the sustainable and fair use of digital technology.

However, this research work has some limitations, listed as follows: First, the study relies on data from the Scopus database, which, despite its extensive coverage, could provide an incomplete view of the research in the area due to the inclusion of the non-Scopus indexed studies. Secondly, the study is conducted with a specific time horizon (1995–2024) and, thus, there is potential to identify different patterns of the impact of digital technologies and sustainability in future studies. Furthermore, the bibliometric approach is helpful to some extent in identifying patterns and trends, but provides a simplistic view of interdisciplinary research. Nevertheless, the study contributes useful knowledge for future research and application to help advance the knowledge of digital technologies and their sustainable use in the future.

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